**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in this application.

**Listing of Claims:**

Claim 1 (Currently Amended): A method for manufacturing an object having a potential {x} that is generated in response to a field {f} applied thereto, the method comprising:

generating a computerized mathematical model of the object by discretizing a geometric model of the object into a plurality of finite elements and specifying values for the field {f} and potential {x} relative to the finite elements;

calculating a material property matrix [k] based on the field ~~force~~ {f} and the potential {x};

extracting material property coefficients from the material property matrix [k] for each finite element in the computerized mathematical model;

comparing the extracted material property coefficients to material property coefficients for known materials to match the extracted material property coefficients to the material property coefficients for known materials;

determining manufacturing equipment control parameters for each volume increment of the object based on the matched material property coefficients;

controlling the manufacturing equipment in accordance with the determined manufacturing equipment control parameters to thereby manufacture the object,

wherein, if the matched material property coefficients correspond to a composite material, the manufacturing equipment control parameters comprises parameters for controlling composite manufacturing equipment and the controlling of the manufacturing equipment comprises controlling composite manufacturing equipment, and

wherein the composite material comprises structural fibers laminated in a resin matrix into which an impurity is introduced, the amount of the impurity introduced into

the resin matrix being controllably variable for the respective volume increments of the object.

Claim 2 (Previously Presented): The method according to claim 56, wherein the material properties of the finite elements are specified to be isotropic.

Claim 3 (Previously Presented): The method according to claim 56, wherein the material properties of the finite elements are specified to be transversely isotropic.

Claim 4 (Previously Presented): The method according to claim 1, wherein the generating of a computerized mathematical model of the object further includes determining the smallest volume increment that can be manufactured using the manufacturing equipment.

Claim 5 (Original): The method according to claim 1, wherein the field {f} is a mechanical force field and the potential {x} is a displacement.

Claim 6 (Original): The method according to claim 1, wherein the field {f} is an electric current field and the potential {x} is a voltage.

Claim 7 (Original): The method according to claim 1, wherein the field {f} is a magnetic field and the potential {x} is a magnetic vector potential.

Claim 8 (Original): The method according to claim 1, wherein the field {f} is a thermal flux field and the potential {x} is a temperature.

Claim 9 (Original): The method according to claim 1, wherein the field {f} is a fluid velocity field and the potential {x} is a fluid potential.

Claims 10 and 11 (Canceled).

Claim 12 (Previously Presented): The method according to claim 1, wherein the impurity comprises biologic material.

Claim 13 (Previously Presented): The method according to claim 1, wherein the impurity comprises bone.

Claim 14 (Previously Presented): The method according to claim 1, wherein the impurity comprises crushed bone.

Claim 15 (Previously Presented): The method according to claim 1, wherein the impurity comprises co-factors.

Claim 16 (Previously Presented): The method according to claim 1, wherein the impurity comprises biological cells.

Claim 17 (Previously Presented): The method according to claim 1, wherein the impurity comprises bio-active materials.

Claim 18 (Previously Presented): The method according to claim 1, wherein the impurity comprises medications.

Claim 19 (Previously Presented): The method according to claim 1, wherein the impurity comprises antibiotics.

Claim 20 (Previously Presented): The method according to claim 1, wherein the impurity comprises radioactive materials.

Claim 21 (Previously Presented): The method according to claim 1, wherein the object being manufactured is a prosthetic implant for replacing a body part and the

field {f} and potential{x} are specified based on the in vivo forces applied to the body part to be replaced and the in vivo displacements generated in the body part to be replaced when the forces are applied thereto.

Claim 22 (Previously Presented): An object made in accordance with the method of claim 1, wherein the object is selected from the group consisting of an automobile part, an aircraft part, a prosthetic implant, a golf club shaft, a tennis racket, a bicycle frame, and a fishing pole, and wherein different portions of the object have different material properties corresponding to the matched extracted material property coefficients for known materials.

Claim 23 (Original): A prosthetic implant manufactured in accordance with the method of claim 1.

Claim 24 (Original): A golf club manufactured in accordance with the method of claim 1.

Claim 25 (Currently Amended): A computer-implemented method for determining machine control instructions for manufacturing an object having a potential {x} that is generated in response to a field {f} applied thereto, the method comprising:

generating a computerized mathematical model of the object by discretizing a geometric model of the object into a plurality of finite elements and specifying values of the field {f} and potential {x} relative to the finite elements;

calculating a material property matrix [k] based on the field ~~force~~ {f} and potential {x};

extracting material property coefficients from the material property matrix [k] for each finite element in the computerized mathematical model;

comparing the extracted material property coefficients to material property coefficients for known materials to match the extracted material property coefficients to the material property coefficients for known materials;

determining manufacturing equipment control parameters for each volume increment of the object based on the matched material property coefficients; and

generating machine control instructions for controlling the manufacturing equipment in accordance with the manufacturing equipment control parameters to manufacture the object,

wherein, if the matched material property coefficients correspond to a composite material, the manufacturing equipment control parameters comprise parameters for controlling composite manufacturing equipment and the machine control instructions comprise instructions for controlling the composite manufacturing equipment, and

wherein the composite material comprises structural fibers laminated in a resin matrix into which an impurity is introduced, the amount of the impurity introduced into the resin matrix being controllably variable for the respective volume increments of the object.

Claim 26 (Previously Presented): The method according to claim 25, wherein the object being manufactured is a prosthetic implant for replacing a body part and the field {f} and potential{x} are specified based on the in vivo forces applied to the body part to be replaced and the in vivo displacements generated in the body part to be replaced when the forces are applied thereto.

Claims 27 and 28 (Canceled).

Claim 29 (Previously Presented): The method according to claim 25, wherein the impurity comprises biologic material.

Claim 30 (Previously Presented): The method according to claim 25, wherein the impurity comprises bone.

Claim 31 (Previously Presented): The method according to claim 25, wherein the impurity comprises crushed bone.

Claim 32 (Previously Presented): The method according to claim 25, wherein the impurity comprises co-factors.

Claim 33 (Previously Presented): The method according to claim 25, wherein the impurity comprises biological cells.

Claim 34 (Previously Presented): The method according to claim 25, wherein the impurity comprises bio-active materials.

Claim 35 (Previously Presented): The method according to claim 25, wherein the impurity comprises medications.

Claim 36 (Previously Presented): The method according to claim 25, wherein the impurity comprises antibiotics.

Claim 37 (Previously Presented): The method according to claim 25, wherein the impurity comprises radioactive materials.

Claim 38 (Original): A computer system programmed to perform the method of claim 25.

Claim 39 (Previously Presented): A control system programmed with machine control instructions for controlling composite manufacturing equipment to manufacture the composite object, wherein the machine control instructions are generated in accordance with the method of claim 25.

Claim 40 (Previously Presented): Composite manufacturing equipment comprising a control system programmed with machine control instructions for controlling the composite manufacturing equipment to manufacture the composite object,

wherein the machine control instructions are generated in accordance with the method of claim 25.

Claim 41 (Currently Amended): A method for manufacturing an object for which a defined field {f} generates a potential {x} in response thereto, the method comprising:

(1) generating a computerized mathematical model of the object by discretizing a geometric model of the object into a plurality of finite elements;

(2) specifying values of the field {f} and the potential {x} relative to the finite elements;

(3) calculating a material property matrix [k] based on the field ~~force~~ {f} and the potential {x}, wherein the material property matrix [k] comprises a plurality of values each corresponding to one or more material property coefficients;

(4) comparing each of the plurality of values in the material property matrix [k] to known material properties and, responsive to a match, selecting a corresponding manufacturing process parameter for a volume increment of the object, wherein the selected manufacturing process parameter is usable for controlling composite manufacturing equipment if the matched known material property is a material property for a composite material;

(5) controlling the composite manufacturing equipment in accordance with the selected manufacturing process parameters to thereby manufacture the object,

wherein the composite material comprises structural fibers laminated in a resin matrix into which an impurity is introduced, the amount of the impurity introduced into the resin matrix being controllably variable for the respective volume increments of the object.

Claim 42 (Previously Presented): The method according to claim 41, wherein the object being manufactured is a prosthetic implant for replacing a body part and the field {f} and potential {x} are specified based on the in vivo forces applied to the body

part to be replaced and the in vivo displacements generated in the body part to be replaced when the forces are applied thereto.

Claims 43 and 44 (Canceled).

Claim 45 (Previously Presented): The method according to claim 41, wherein the impurity is selected from the group consisting of: biologic materials, bone, crushed bone, co-factors, biological cells, bio-active material, medications, antibiotics, and radioactive materials.

Claims 46-55 (Canceled).

Claim 56 (Previously Presented): The method according to claim 1, further comprising:

specifying that the material properties of the finite elements have a particular symmetry.